

## Editorial

### An Atmospheric Sciences Section

It has been proposed that the name of the Meteorology Section be changed to 'Atmospheric Sciences Section.' Such a change would emphasize the interdisciplinary nature of the scientific interests pursued by AGU members. It would encourage atmospheric chemists and atmospheric electricians to affiliate with the section.

There is also considerable interest in combining this section with certain portions of SPR: Aeronomy. Some aeronomers have shown interest in joining Atmospheric Sciences and some want to stay in SPR.

Unfortunately, there are few convenient ways to explore the opinions of the entire membership of both sections regarding the proposed change other than this editorial. In October 1981 to your section president or president-elect. Is the name change appropriate? Is such a merger with parts of SPR: Aeronomy reasonable? If this is done how would one determine what parts of Aeronomy should join Atmospheric Sciences and what parts should stay in SPR?

We also plan to have business meetings of the Meteorology Section and the SPR Section at the Fall Meeting of the AGU to consider this matter further.

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## A Former Editor Views the Editorial Process

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University of British Columbia  
Vancouver, B.C., Canada

### Introduction

It was at the AGU Fall Meeting in San Francisco in December 1976, shortly after my appointment as coeditor of *Water Resources Research* that I first began to realize the strong emotional ties that exist between a scientific community and its journals. Feelings run high, regardless of whether they come from readers, contributors, reviewers, active scientists, or scientific administrators. Opinions are often positive, sometimes negative, usually a mixture of the two; but regardless of their tenor they are delivered to the editor, in person, usually fortissimo. From that day until this, conference life has never been dull. When I meet a colleague in the hall there is never a loss for words, no need to search for a topic of mutual interest; WRR is always there at the ready.

Over these years I have listened to suggestions, complaints, opinions, proposals, questions, complaints, secrets, and curses. But when stripped of the specifics, most of my colleagues were asking a variant of one of the following seven questions:

1. Why did it take so long for my paper to appear?
2. How could you possibly have rejected my recent submission (especially in light of the enthusiastic support of reviewer D and the obvious incompetence of reviewers A, B, and C)?
3. How could you possibly have accepted the paper by Smith and Jones (especially after the scathing review I sent you)?
4. What is the policy of WRR toward multiple-part papers?
5. What is AGU's page charge policy with respect to WRR?
6. Why does WRR publish so many theoretical papers and so few applied papers?
7. Is the review process really needed at all?

I am writing this article in the hope that it will provide some answers to these questions and that it may help to clarify the murky workings of the editorial process. Of course, as with all clarifications, there is a hitch. My term as editor expired on January 1, 1981, and philosophies of editing are notoriously personal. My successor as coeditor for the physical sciences side of WRR is Steve Burgess of the Department of Civil Engineering at the University of Washington in Seattle. He has read this article and on the reviewer appraisal form, he recommended 'publication with minor revision.' This response suggests either that our personal philosophies are not all that far apart or that this is the hydrologic equivalent of the Nixon pardon.

The editorial board of *Water Resources Research* consists of two coeditors and a slate of associate editors. During my tenure, I was fortunate to work first with Dava Major and then with Jerry Cohen as coeditor for the social sciences side of WRR. At various times, 25 different scientists (see box) served as associate editors, and all were involved in both the day-to-day processing of manuscripts and the long-term development of policy. They deserve a great deal of credit for the success of the journal.

\*Coeditor, *Water Resources Research*, 1977-1980

### Associate Editors, WRR, 1977-80

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William E. Sopper, Pennsylvania State University  
Keith O. Stollenbeck, Massachusetts Institute of Technology  
Eric Wood, Princeton University  
The hours they put in on behalf of the journal are long; the thanks they get is embarrassingly meager.

### The WRR Editorial Process

The WRR editorial process is outlined in Figure 1. Authors submit their papers to one of the two coeditors, who in turn select an associate editor to process the paper. Associate editors are responsible for selecting reviewers and ensuring that reviews are completed within a reasonable time. After analyzing the reviews, the associate editor may return the paper directly to the editor, author for rejection or because no revisions are needed, or he may return it to the author for revision. Authors are instructed to send their revised manuscript back to the associate editor so that he can check to see that the requested revisions have been carried out. If so, the manuscript comes back to the editor and thence to AGU for publication. One copy of the typescript and the glossy prints of the figures are kept on file at the editor's office during the entire editorial process. Final notification of acceptance or rejection comes to the author from the editor's office. In rare instances, the editor may choose to reject a paper without sending it through the full review process.

Figure 1 also shows the range of elapsed times that one might expect for each step of the editorial process. The total processing time is controlled in large part by the time taken by reviewers during the review stage and by authors during the revision stage. With mailing times now running between 1/2 and 1 1/2 weeks, even if reviewers and authors respond quickly, total processing time takes 2 1/2 months. A more usual period would be 5 months; and if reviewers, authors, and the mails are all slow, the editorial process can take 8 months. Statistics kept by the AGU Publications Division confirm this analysis. In 1979, for example, 10% of the submissions were sent to AGU within 14 weeks and 50% within 28 weeks. There were 10% that took longer



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Cover. Beam plasma discharge: (left) A 25 mA, 1.8 keV electron beam injected at 60° pitch angle in a magnetic field of 1.5 gauss and a neutral gas pressure of  $9 \times 10^{-6}$  torr. (right) All conditions same except current increased to 60 mA. What was formerly individual particles Larmor motion (left) has ignited into a strong luminous ionization column filling the Larmor spiral (right). Collective action of the beam and its self-made plasma in producing intense electric waves which accelerate electrons and ionize the neutral gas is responsible. (Photo by Hugh Anderson and Jerry Jost at the NASA Johnson Space Center Vacuum Test Facility; camera exposure about 1 min at f:2.8 using ASA 3000 film. See meeting report, p. 676, for more information.)

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SEPTEMBER 15, 1981

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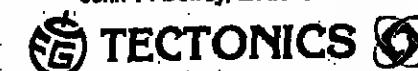
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### Reviews, Rejection, and Type II Errors

Apart from the obvious pleasure of gamesmanship, the purpose of the reviewing process is presumably twofold: (1) to provide authors with information to improve their presentation, and (2) to provide editors with information to aid

### Multiple-Part Papers

### Page Charges

Many authors fail to submit good work to WRF because they feel that they would be unable to pay the page

## Re: Magnetic Monopoles

Joseph C. Cain  
Branch of Electromagnetism  
and Geomagnetism  
U.S. Geological Survey  
Denver, Colo.

The editorial process is carried out independently of the page charge decision.

## Theory and Practice

## Sociology of the Reviewing Process

The most fundamental question that can be asked about all this is: 'Is the review process really necessary?' A negative response would probably be treading on the rather thin line that exists between the review process and censorship, and on the question of bias.

Surprisingly perhaps, there has been a good deal of sociological study of these questions. Ever since Derek de Solla Price first turned the methods of science on science itself (Price, 1964), there have been numerous statistical

... it is every editor's prerogative to judge for himself the balance point he wishes to occupy on the tightrope . . .

Zuckerman and Merton [1971] report more encouraging results with respect to bias. They investigated the effect of the relative ranks of author and referee on the referee's decision. The first rank was a small group of award-winning physiologists; the second rank was a larger group, whose biographies were widely available in scientific who's-who listings; and this third rank was the very large group that didn't qualify for either of the first two ranks. Six possible forms of bias were investigated. If authors outrank referees, either status deference or status envy could be important. If referees outrank authors, bias might take the form of status patronage or status subordination. If author and referee come from the same rank, the referee could feel status competition or status solidarity. The statistical studies did not lead to the acceptance of any of these six hypotheses.

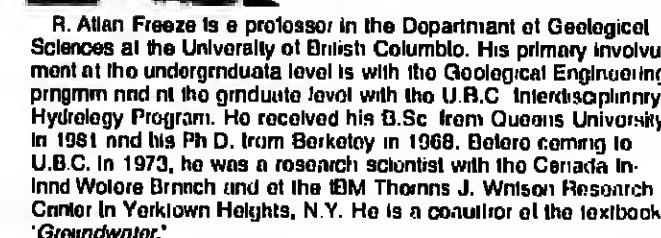
### Update: Mt. St. Helens

The seismicity changed character to lower-frequency events with emergent arrivals after dawn on September 8. About 1000 avalanche events began to dominate the seismic record, with only a few discrete low-frequency events appearing for the next several hours. USGS personnel working in the crater observed huge blocks falling from the northern portion of the June lobe and were soon forced to retreat to a ridge north of the crater. On the seismic record, avalanche events peaked about noon but remained at high levels until about 1700. Clouds of dust from the frequent rockfalls made observation of the crater difficult, but by 1500-1530 it was evident to USGS personnel that the northeast portion of the June lobe was breaking up. A lobe, but appeared to be developing on the east side of the crater. By 1800-1700, an area of tens of square meters of fresh lava was clearly visible on the dome, and by 1830, many glowing rockfalls could be seen; some of the falling material appeared to be fluid. The number of seismic

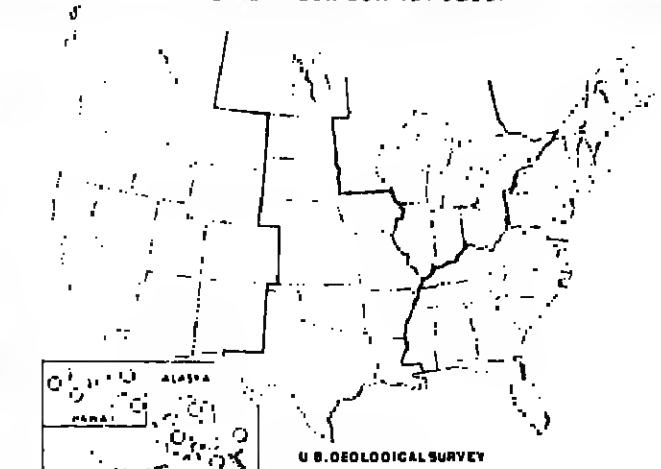
Lastly, there is the question of whether a review system that manages to reject only one quarter of its submissions is superfluous on that ground alone. This view neglects the fact that the remaining 75% may be strengthened. In addition, as Zuckerman and Merton have noted, the very existence of a reviewing system serves as a form of quality control. Knowing that their papers will be reviewed, authors take care in preparing them, and often the journal's high standards become their own.

## Acknowledgments

The author would like to thank Steve Burges, Jerry Cohen, and Jim Wells for thoughtful comments.



STREAMFLOW DURING AUGUST



Above normal (within the highest 25 percent of record for this month)	In normal range	Below normal (within the lowest 25 percent of record for this month)
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## Nation's Water OK Despite Dry Spots

USGS hydrologists said that erases of low flow conditions persisted in much of the West and stretched across the Southeast from Virginia south to Florida and west to Louisiana. A small area of New York and most of Connecticut and Rhode Island were also well below normal—within the lowest 25% of record; that is, 75% of the time, streamflow will equal or exceed the measured levels.

About one third of the 164 key index stations reporting in August showed well below normal streamflow in parts of 24 states. The low flow conditions are relatively unchanged from those reported last month, when 23 states reported extreme low flows.

In contrast to the erees of low flow, streamflow in the Great Lakes region was generally well above normal, as were flows in northern New England and portions of the Okotaa. Southeastern Texas reported high flows and near-record local flooding in some areas.

Indicative of the generally good conditions in much of the

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country, the combined flow of the nation's 'Big Five' rivers (Mississippi, St. Lawrence, Columbia, Ohio, and Missouri) averaged 890 billion gallons a day during August, 31% above normal. August marks the third straight month of above-normal flow of the Big Five, after 6 straight months of below-normal conditions. The Big Five, which account for stream runoff in about half of the continental United States, provide a quick check on the pulse of the nation's water resources. (Photo credit: U.S. Geological Survey, Department of the Interior.)

### Linking Star Age and Rotation

As a star ages, it rotates more and more slowly. Astronomers believe that stellar winds (escaping gases that carry trapped magnetic fields to great distances) are the cause: they gradually drain the star of its internal rotational momentum. Also, with increasing age a star's magnetic activity declines. Are the two phenomena—slowing rotation and decreasing magnetic activity—related? Arthur H. Vaughan of the Mount Wilson and Las Campanas observatories reports evidence that rotation of stars similar to the sun varies with their observed magnetic behavior.

Vaughan and his coworkers developed a new method for measuring how rapidly stars rotate. Relatively little had been known about the rotational rates of stars like the sun because their rotation speeds are often too small to measure by classical spectroscopic means. The method, to be described in the November *Astrophysical Journal*, is an adaptation of work done since 1988 by Olin C. Wilson at the Mount Wilson Observatory.

In most ordinary stars, dark "spots," corresponding to sunspots, would be imperceptible. However, it is known from the sun that such spots or groups of spots are accompanied by intense emission of light at two particular wavelengths visible through the earth's atmosphere: the H and K lines of ionized calcium. By measuring the strength of these emission lines, Vaughan's group was able to study stellar magnetism and to detect effects of rotation. From these measurements springs new evidence linking stellar rotation rates and magnetic intensities.

Vaughan's group found that among stars of a given spectral type (or surface temperature, stellar radius, or mass), the faster the rotation, the greater the average level of a star's magnetic activity. They base their work on 100 consecutive all-night observations of 45 stars.

## New Publications

### Petrology and Genesis of Leucite-Bearing Rocks

A. K. Gupta and K. Yegh, *Minerals and Rocks*, vol. 14, Springer-Verlag, New York, 282 pp., 1980, \$39.00.

Reviewed by D. M. Francis

In the preface, the authors state the need for a 'review-synthesis' of the data available on high-potassium volcanic associations. As a review, their book is a valuable source for information and references concerning this unusual, but wide spread, class of volcanic rocks. It is particularly useful as a collection of representative whole rock analyses and experimental results of relevant phase equilibria studies. As a synthesis, however, this book leaves much to be desired. The authors have chosen to paraphrase or quote the works of others, adding little in the way of comparison, evaluation, or interpretation of the results of these works. The job of distillation and synthesis is left to the reader. This is a problem that runs throughout the book. In the chapter on nomenclature, they begin well by advocating the use of standard rock names such as basalt and tephritite with mineral modifiers (i.e., leucite basalt). They rapidly descend, however, into the bizarre alkaline world of jumbilla, eranditas, etc., making little attempt to clean up this legacy of a parochial age in geology. In the chapter describing individual localities, the authors again paraphrase original reports so that one wonders about the relationships between such 'creatures' as the fityrolytes of Australia and the wyomingites of their namesake. Frequently, different chemical or mineralogical plots (after the original reports) are employed for different occurrences. It is the reader who must all through the actual whole rock analyses in an effort to compare and contrast the individual volcanic suites. This work should have been done by the authors, both in the text and through the use of common chemical plots.

The final chapter on possible origins of highly potassic magmas is the only one in which the authors attempt a critical evaluation rather than a parade of the results and

hypotheses of previous studies. In doing so, however, they devote an inordinate amount of attention to old, out of date ideas and very little attention to developing the present modal involving the melting of a phlogopite-rich mantle source. Much could have been discussed in relation to this hypothesis, including mantle metasomatism, implications of the relative stabilities of mica and amphibole, the possible involvement of the low velocity zone, tectonic significance, etc., but was not. To say simply that potassium-rich magmas are generated from potassium-rich mantle only transfers the problem.

From a technical point of view, I am concerned about the treatment of the chemistry of these rocks. There is no section that discusses their major element compositions and resultant implications. This inattention gets the authors into difficulty when they later, from experimental results on simple systems, that tephritite will fractionate to basaltic, in-spection of relevant whole rock analyses indicates that the reverse must be the case. The chapter on mineralogy gives compositional data in weight percent with no conversion to formula notation. Without this, the extent and significance of mineral solid solution cannot be appreciated. The chapter on trace elements and isotopic data is also inadequate. Trace element data are simply listed (many of which are dated) with no discussion of the behavior and implications of characteristic groups such as LIL elements, high field strength elements, and highly compatible elements. Similarly, there is little discussion of the significance of the isotopic data given for these rocks.

In summary, this book has value as a compilation under one cover of much of the data available on highly potassic volcanic rocks. It is essentially, however, a book of lists. Unfortunately, the authors have missed the opportunity, which this type of format provides, to contribute a comprehensive synthesis of the state of knowledge on this type of volcanism. It is indicative of the book as a whole, I think, that no attempt of current problems nor suggestions for directions of future research are made. Opinions are required of experts as well as facts!

D. M. Francis is with the Department of Geology, McGill University, Montreal, Quebec, Canada.

## Honor Your Colleagues

### The Fellows Committee of AGU

This committee, under the chairmanship of Nicholas C. Metcalfe, is seeking nominations for Fellows of the Union. Nominations for fellowship should be submitted by those who have attained acknowledged eminence in a branch of geophysics. Fellows' nominations must be made on forms available from the Member Programs Division, American Geophysical Union, 2000 Florida Avenue, N.W., Washington, D.C. 20009 (telephone: 202/462-6903 or toll free 800/424-2488).

Fellows elected in 1981 were:

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Michael Selwyn Longuet-Higgins	

DEADLINE FOR NOMINATIONS IS  
NOVEMBER 15, 1981

### New Listings

Items listed in New Publications can be ordered directly from the publisher; they are not available through AGU.

**Mharelis from the Marine Environment**, Sir Peter Karl, John Wiley, New York, viii + 88 pp., 1981, \$13.95.  
**The Ocean Beefs and Mergins**, vol. 5, The Arctic Ocean, A. E. Naim, M. Churkin, Jr., and F. G. Stehlé (Eds.), Plenum, New York, xiv + 872 pp., 1981, \$55.00.  
**Paleoecology, Concepts and Applications**, J. R. Dodd and R. J. Stanton, Jr., John Wiley, New York, xiv + 559 pp., 1981, \$39.95.  
**Pollution Pricing: Industrial Response to Wastewater Charges**, J. F. Hudson, E. E. Laka, and D. S. Grossman, Lexington Books, Lexington, Mass., xix + 213 pp., 1981, \$23.95.  
**Precambrian Plate Tectonics: Developments in Precambrian Geology**, 4, A. Kröner (Ed.), Elsevier, New York, xxi + 781 pp., 1981, \$185.25.  
**The Urban Climate**, H. E. Landsberg, Academic, New York, x + 275 pp., 1981, \$29.50.  
**The World Ocean: An Introduction to Oceanography**, 2nd ed., W. A. Rukhovich and R. W. Stamborg, Prentice-Hall, Englewood Cliffs, N.J., xlii + 513 pp., 1981, \$19.95.

**Geophysical Geologists: The University of Texas at Austin, Institute for Geophysics.** For research scientist positions are now available at the University of Texas Institute for Geophysics in the fields of marine geophysics, tectonics, seismic stratigraphy, seismic reflection techniques and data processing, ocean bottom seismometer (OBS) and other seismographic instrument design and development, earthquake seismology, and lunar and planetary seismology.

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**University Department of Geology and Geophysics.** Applications are solicited for a faculty position in solid earth geophysics to begin in the academic year 1982-83. Areas of interest to the Department include seismology, exploration geophysics, mechanical and physical properties of rocks and minerals, geomagnetism, and tectonophysics. The University is an equal opportunity/affirmative action employer and encourages women and members of minority groups to compete for this position. Curriculum vitae, publications, and the names of three or more referees should be sent by 31 October 1981 to Robert B. Gordon, Chairman, Department of Geology and Geophysics, P.O. Box 6666, New Haven, CT 06511.

**Petroleum Northern Illinois University.** Applications are invited for a tenure track position in igneous or metamorphic petrology at the assistant or associate professor level beginning either January, 1982 or August, 1982. A Ph.D. degree is preferred. The successful candidate will be expected to pursue an active research program, teach at the undergraduate and graduate levels, and direct Masters and Ph.D. graduate research work. Facilities housed within the Department of Geology include a fully automated electron microprobe, SEM, XRF, and XRD. To receive full consideration, please send resume, statement of research interests, and the names of three referees, by November 1, 1981, to Jonathan H. Berg, Search Committee Chairman, Department of Geology, Northern Illinois University, DeKalb, Illinois, 60115. An equal opportunity/affirmative action employer.

**Research Position in Chemical Oceanography.** California Institute of Technology, Division of Geological and Planetary Sciences. The position of research fellow is being offered at Caltech for research in oceanography. Investigation of the isotopic composition of neodymium and rare earth abundances in sea water and sediments is now being carried forward. The mechanism of injection of REE into sea water will be studied. The differences in REE patterns in various water masses (Pacifica, Atlantic, Indian and Pacific) will be studied. The position is at Earth and Planetary Sciences, Division of Geological and Planetary Sciences, Earth and Planetary Sciences, 125-108 (1980) is now being carried forward as an exploratory venture in order to determine the origin and chemical behavior of REE in the ocean and the potential use of REE as a tracer. The laboratory facilities for sample preparation and analysis are fully functional and well equipped. Applicants should have training in oceanic geochemistry and a good perspective on general physical oceanographic models.

Send resume and references to Professor G. J. Wasserburg, Lunar and Planetary Institute, California Institute of Technology, Pasadena, CA 91125. Caltech is an equal opportunity/affirmative action employer (D/H).

**Research Position in Remote Sensing.** Applications are invited for two research positions in the Department of Geological Sciences, University of Washington.

**Research Assistant Professor:** to do research and teaching in geological remote sensing. Candidate is expected to have at least two years' experience beyond the Ph.D. and a demonstrated research record in the application of remote sensing techniques to the geology of planetary surfaces. Experience with instrument design, computer programming and digital image processing is also necessary.

**Research Associate:** to conduct research in remote sensing of vegetation and rock vegetation mixtures. Candidate must have a Ph.D. in forestry or related science, and a strong background in computer programming and operation of digital image processing systems.

Submit vitae and names of three references to John B. Adams, Chairman, Dept. of Geological Sciences, A-20, University of Washington, Seattle, Washington 98195. Closing date is October 31, 1981.

Equal opportunity/affirmative action employer.

### EARTH SCIENCES

The Lamont-Doherty Geological Observatory of Columbia University invites scientists interested in any field of the earth sciences to apply for the following fellowships: two postdoctoral fellowships, each awarded for a period of one year (extendable to two years in special instances) beginning in September 1982 with a stipend of \$22,500 per annum. Completed applications are to be returned by January 15, 1982.

Application forms may be obtained by writing to the Director, Lamont-Doherty Geological Observatory, Palisades, New York 10964. Award announcements will be made February 28, 1982 or shortly thereafter.

The Observatory also welcomes applications from candidates for postdoctoral research associate positions in this discipline.

**Senior Faculty Position: Meteorology.** Applications and nominations are invited for a senior faculty position in meteorology, at the University of Utah. Eligible applicants will also be considered for chairperson of the department. Candidates must possess a Ph.D. in meteorology or a related discipline. Applicants should have teaching and research experience and be interested in participating in both the graduate and undergraduate programs. Applicants should submit curriculum vitae and names of three professional references to:

Dr. Jan Peagle  
Search Committee  
Department of Meteorology  
University of Utah  
Salt Lake City, Utah 84112  
Deadline for applications November 30, 1981.  
The University of Utah is an affirmative action equal opportunity employer.

**University of Kansas Sedimentology/Structural Geology.** The Department of Geology of the University of Kansas, Lawrence, Kansas seeks applicants for two tenure track appointments that will begin in the fall of 1982 or spring of 1983. Geologists who meet the requirements for these positions and who can begin work in January 1982, are also invited to apply. Outlets include teaching in our introductory, undergraduate major, and graduate courses; supervising graduate student theses and dissertations; conducting original research; and providing service through administrative and professional activities. Appointment to either one of these positions is potentially at any academic rank, but one or the other or both will be filled at the assistant professor level. Applicants must have the Ph.D. in hand or expect to complete it by the end of the first year of employment at the University. Minimum salary for the assistant professor level is \$23,000; salary for each position will be determined by rank and experience.

**Position 1: Sedimentology.** We will consider applicants in any branch of sedimentology, but those with interests in studying carbonate rocks, in the geology and sedimentary geochemistry, or in the relationships of sedimentology and tectonics are preferred. The applicant will be expected to cooperate with present faculty in offering courses at the undergraduate and graduate level that cover all aspects of the study of sedimentary rocks.

**Position 2: Structural Geology, Regional Tectonics, or Metamorphic Petrology.** The successful applicant will be expected to teach a graduate undergraduate structural geology course, offer graduate courses or seminars in some areas listed above, plus cooperate with present faculty in offering undergraduate or graduate courses in mineralogy, petrology, physical geology, or Precambrian geology. If no suitable candidates apply for this position, the department may recommend hiring two of the applicants for position 1.

In the event the two candidates are about equally qualified, preference will be given to applicants for one of the positions who have experience that will allow them to teach a modern course in petroleum and subsurface geology or to applicants who will participate in the Department's summer field geology teaching program.

Priority will be given to applications received by November 8, 1981. Applications will be accepted from qualified candidates until the positions are filled. Applicants should send a letter of application, a resume, and names of three references to: Anthony W. Wetton, Department of Geology, The University of Kansas, Lawrence, Kansas 66045 (913) 844-4974. The letter of application should include a statement of current and planned research interests and of courses that the applicant feels qualified to teach. An equal opportunity/affirmative action employer.



Princeton  
University

PLASMA PHYSICS  
LABORATORY

## RESEARCH POSITION IN THEORETICAL AND NUMERICAL SPACE PLASMA PHYSICS

A research position is available immediately in the Theoretical Division of the Plasma Physics Laboratory, Princeton University, for one year with the possibility of renewal for a second year. Physicists with a Ph.D. degree or its equivalent or degrees in other relevant disciplines are encouraged to apply.

The position involves theoretical and numerical simulation studies on space plasma physics under the support of the National Science Foundation. Interaction with the members of the Laboratory engaged in fusion plasma physics is encouraged.

We offer salaries fully commensurate with your experience and a comprehensive benefit package including 24 days vacation per year.

Interested candidates should send a resume and three letters of recommendation to the Personnel Department, Plasma Physics Laboratory, P.O. Box 451, Princeton University, Princeton, N.J. 08544. Please refer to position #H081.

PLASMA PHYSICS  
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To find new oil, gas, and mineral deposits, Gulf is developing exploration data processing systems that require the most advanced hardware and software.

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### Reduced Rates for AIP Journals

The American Institute of Physics (AIP) offers reduced-rate subscriptions of its journals to individual members of affiliated societies, including AGU. The offer is limited to one subscription per person to each journal.

Rates for 1982 for AGU members are given below:

	U.S. Member	Non-U.S. Member
<i>Journal of Applied Physics</i>	\$50.00	\$70.00
<i>Applied Physics Letters</i>	30.00	45.00
<i>The Journal of Chemical Physics</i>	80.00	120.00
<i>Journal of Mathematical Physics</i>	40.00	50.00
<i>The Physics of Fluids</i>	25.00	47.00
<i>Physics Today</i>	30.00	33.00
<i>The Review of Scientific Instruments</i>	30.00	40.00
<i>Current Physics Index</i>	50.00	60.00
<i>Journal of Physical and Chemical Reference Data</i>	38.00	44.00

To take advantage of this discount service, AGU members should send subscription orders, remittances, and a statement indicating membership status to AIP, 335 East 47th St., New York, NY 10017.

## Classified

EOS offers classified space for Positions Available, Positions Wanted, and Services, Supplies, Courses, and Announcements. There are no discounts or commissions on classified ads. Any type that is not publisher's choice is charged for at display rates. EOS is published weekly on Tuesday. Ads must be received in writing on Monday 1 week prior to the date of the issue required.

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**STUDENT OPPORTUNITIES**  
For special rates, query Robin Little,  
800-424-2488.

### POSITIONS AVAILABLE

**Arizona State University, Department of Chemistry.** Visiting professor, 1982-83 academic year or part thereof. We seek a person or persons with established research programs in geochemistry, mineralogy, petrology, and/or solid state chemistry to teach advanced special topics courses(s), interact with faculty and students, and pursue own research. May be an excellent educational opportunity for established scientist. Contact: A. Navrotsky, Department of Chemistry, Arizona State University, Tempe, AZ 85281, (602) 985-4241. An AA/EEO employer.

**Director Geodetic Survey, NOAA.** The National Oceanic and Atmospheric Administration (NOAA) announces a Senior Executive Service vacancy for the position of Director, Geodetic Research and Development Laboratory (GRDL) in the National Geodetic Survey, a component of the National Ocean Survey. The duty location is Rockville, Maryland. The salary range is \$47,899-\$59,112.50 per annum. Duties include providing technical and administrative supervision over employees and activities of GRDL; advising officials on the state of scientific knowledge in geodesy and making recommendations for research and development; exercising scientific and technical knowledge of contributing publications to professional journals and making presentations at national and international meetings; and advising and consulting scientists and executives in improvement of geodesy and related fields. Experience in management of scientific programs, geodesy, and solid earth sciences is required. Apply to: NOAA/NGS-8001 Executive Boulevard, Rockville, Maryland 20852. Attn: MS/PER12-TR. NOAA is an equal opportunity employer.

**Research Associate in Geochemistry/University of Chicago.** Post-doctoral position involving extraction of micro-samples from meteorites under clean conditions and analysis for major and trace elements by instrumental and radiochemical neutron activation. Goal is to investigate behavior of the elements during condensation of the solar system. Experience in geological samples an asset, in meteorites a definite plus and in radiochemistry necessary. Send vitae and names of two referees to Professor Lawrence Grossman, Department of Geophysical Sciences and Enrico Fermi Institute, University of Chicago, Chicago, Illinois 60637. The University of Chicago is an affirmative action/equal opportunity employer.

**City University of New York, Brooklyn College Faculty Positions.** The Department of Geology endorses filling several tenure track positions at Full Professor level. (Salary range up to \$43,400). Highly qualified individuals will be considered for distinguished appointments at an additional \$5,000. While candidates who have distinguished themselves in any field are welcome to contact us, we are particularly interested in openings in: energy resources (coal/petroleum), exploration geophysics, environmental geology or hydrogeology, coastal sedimentology, economic geology. Successful applicants will be required to initiate and supervise research programs and to supervise Master's and Ph.D. theses. Nominations and applications with current vitae should be sent to: Dr. S. Bhattacharya, Chairman, Dept. of Geology, Brooklyn College of City University of New York, Brooklyn, New York 11210. Positions open until filled. Brooklyn College, CUNY, is an affirmative action/equal opportunity employer.

**University of New Orleans/Geophysics.** Applications are invited for a permanent faculty position commencing August 1982, in exploration geophysics. The Ph.D. or equivalent experience is required. Applicants will be expected to teach graduate and undergraduate courses in geophysics and general geology, conduct a program of research, supervise theses and oversee a program in geophysics. The position will be at the assistant professor level or higher depending on background. Applications are encouraged from individuals with industrial experience, including recent retirees. Applicants should send a letter outlining interest in position, complete resume, and three letters of recommendation to Dr. Gordon Frey, Department of Earth Sciences, Lake Front, University of New Orleans, New Orleans, LA 70122. UNO is an equal opportunity/affirmative action employer. Applications from minority groups are specifically invited.

**Hydrogeologist.** The State University of New York at Binghamton is re-opening its search for an assistant or associate professor of hydrogeology to join a department already active in several areas of water studies. The applicant should have a Ph.D. and experience in mathematical techniques, as well as field experience. The applicant will be responsible for instruction at both the undergraduate and graduate levels and for developing a program of research. The position will be filled in September 1982. Please send application, including the names of referees, to: Dr. Thomas W. Donnelly, Chairman, Department of Geological Sciences, State University of New York, Binghamton, New York 13901. We are an equal opportunity/affirmative action employer.



# Engineering Geologist/Geophysicist

The Department of Geological Sciences, University of Saskatchewan, has a vacant tenurable position in engineering geology/geophysics. Applicants should be qualified to teach undergraduate and graduate courses and to conduct research in engineering geology. A background in structural geology may be appropriate. Well-equipped facilities are available for research in rock mechanics, fluid flow through porous media, seismic, and electrical properties of rocks, and paleomagnetism. Good opportunities for joint teaching and research exist. Send application with qualifications, relevant experience, and a list of references to: Dr. W.O.E. Coldwell, Head, Department of Geological Sciences, University of Saskatchewan, Saskatoon, Saskatchewan, S7N 0W0.

Please note: until November 15, 1981 consideration will be given only to applicants who are Canadians or landed immigrants; after that date all applications will be considered.

**Postdoctoral Position Hydrologist/Biologist** Research related to subsurface radioactive waste disposal. Fully documented, clearly written papers on scientific and technical subjects. Ability to deal with interdisciplinary issues and multidisciplinary groups are desired, together with broad experience in scientific research or administration. The applicant's primary expertise may be either in physical sciences (e.g., meteorology, oceanography, chemistry) or in relevant social sciences (e.g., economics) with working familiarity with the other. The appointment will be for an initial period of one year at a salary between \$35,000 to \$41,500, depending on qualifications and experience. It is expected that extension for a second year will be available. Applicant should send letter of application and resumes to Dr. John S. Perry, Climate Administrator for Research and Development, 2101 Constitution Ave., N.W., Washington, D.C. 20118, or call (202) 388-6102.

An equal opportunity/affirmative action employer.

**Department of Geology/Geography Howard University** Applications are invited for tenured position in geology beginning August 1981. Candidates should have PhD and strong background in mineralogy, petrology, and geophysics with industry experience. Will teach and advise at undergraduate level and help in the graduate program in near future. Must have sensitivity to special problems Blacks face in entering field, and commitment to their greater representation. Applicants should send resume with references to Dr. David Schwartzman, Chairman, Dept. of Geology/Geography, Howard University, Washington, D.C. 20059.

An equal opportunity/affirmative action employer.

**Purdue University** The Department of Geosciences invites applications for a faculty position, starting January or July 1982. In the broad field of mineralogy-petrology-geochemistry. A Ph.D. is required and preference may be given to scientists with an established record of research. The Department has an automated electron microprobe, mass spectrometer and laboratory for stable isotope studies, full range of high temperature and high pressure equipment, including furnaces for controlled atmosphere experiments, as well as X-ray equipment. The successful applicant will be expected to participate in both the undergraduate teaching and graduate studies programs, as well as actively engage in research. Rank and salary are open but will be commensurate with qualifications.

Purdue University is a land grant, state support.

ed institution committed to academic excellence, and is an equal opportunity/affirmative action employer. For further information please contact Dr. Henry O. A. Meyer, Dept. of Geosciences, Purdue University, West Lafayette, IN 47907 (Tel. 317-494-3271). Closing date for applications is November 14, 1981.

**Staff Officer Climate Board, National Research Council** The Climate Board of the National Research Council invites applications for a position as principal staff officer for a two-year review and assessment of the implications of increasing atmospheric carbon dioxide. The incumbent will organize meetings of the study committee and related groups, draft and edit reports, supervise clerical/administrative/financial matters, maintain liaison with federal government and international activities, assist in coordination of related National Research Council activities, and participate in support of other Climate Board activities as required.

Applicants should have a doctorate or equivalent in a physical or social science area related to the carbon dioxide issue; demonstrated organizational management ability; proven ability to produce clearly documented, fully documented, and clearly written papers on scientific and technical subjects; and ability to deal with interdisciplinary issues and multidisciplinary groups are desired, together with broad experience in scientific research or administration. The applicant's primary expertise may be either in physical sciences (e.g., meteorology, oceanography, chemistry) or in relevant social sciences (e.g., economics) with working familiarity with the other.

The appointment will be for an initial period of one year at a salary between \$35,000 to \$41,500, depending on qualifications and experience. It is expected that extension for a second year will be available. Applicant should send letter of application and resumes to Dr. John S. Perry, Climate Administrator for Research and Development, 2101 Constitution Ave., N.W., Washington, D.C. 20118, or call (202) 388-6102.

An equal opportunity/affirmative action employer.

**Geophysicist Position** The Physics Department of the University of New Orleans invites applications for tenure track position available January 1982 or August 1982. Rank and salary are to be commensurate with experience and training. Candidates with background in geophysics, acoustics or computational physics are especially encouraged to apply. The UNO departments of Earth Sciences and Physics are jointly developing programs and curricula to respond to the demand for graduates in geophysics in the local metropolitan area and in the south central U.S.

The successful applicant can expect collaborative research support from faculty active in signal processing and enhancement techniques and in inverse scattering analysis. Other areas of departmental research involve atomic, molecular, and solid state physics, cryogenic geophysics, hydrodynamics and computational physics. Applicants should send resume to Professor J. Murphy, Search Committee, Physics Department, University of New Orleans, New Orleans, LA 70148.

The University is an equal opportunity/affirmative action employer.

**Virginia Polytechnic Institute and State University Senior Research Scientist** An interesting and abundant research and publishing opportunities, including new University-owned MOS-10 VLSI/ROMS system, VAX 11/780 computer. Must have experience in theory and application of reflection seismology, and be interested in the application of reflection seismology to the solution of geologic problems.

Send resumes to: Dr. O. R. Wong, Department of Geological Sciences, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0768.

The University is an equal opportunity/affirmative action employer.

**Sedimentologist** The State University of New York at Binghamton has a vacancy for a sedimentologist at assistant professor level. Ph.D. degree holders with research interest in exploration sedimentology or earthquake sedimentology with solid theoretical background are welcome to apply.

The successful candidate is expected to teach courses in applied geophysics, time series analysis, wave propagation, etc. Ph.D. with 0 to 5 years of teaching, research and/or industrial experience is appropriate for the position. Salary negotiable and competitive with academic institutions. Position available September 1, 1982.

Please send resume and names of three references to Chairman, Geophysical Search Committee, Department of Geological Sciences, State University of New York at Binghamton, New York 13901.

We are an equal opportunity/affirmative action employer.

**Director, Office of Programs and International Affairs** The Office of Research and Development, National Oceanic and Atmospheric Administration (NOAA), has an opening for Director, Office of Programs and International Activities, located in Rockville, Maryland. The Office of Research and Development is responsible for administering an integrated program of research, technology and advanced engineering development and transfer relating to the oceans, the Great Lakes, the U.S. coastal waters, the lower and upper atmosphere, and the solar and terrestrial environment to increase understanding of the environment and human impact thereon, and thus provide the scientific basis for improved services. The Director, Office of Programs and International Activities, oversees the coordinated development of policies, programs and budgets, and international activities within the Office of the Assistant Administrator for Research and Development. This is an exciting and challenging opportunity for an individual with demonstrated knowledge of (1) oceanographic, meteorological, environmental, physical and/or engineering sciences (including at least 24 semester hours in physical science and/or closely related engineering science of the college level or above), and (2) program analysis techniques and methods involving broad experience in scientific and technological programs related to the oceans or the atmosphere. A knowledge of U.S. policies on treaties and international multilateral and bilateral agreements is desirable.

**SALARY:** This position will be filled under the General Executive Service (SES). Salary could range from \$47,889 to \$50,112.60 per annum. **APPLICATION:** Interested persons should send a U.S. Standard Form 771, Personal Qualifications Statement by October 9, 1981, to Mrs. Susan C. Caser, Personnel Management Specialist, Office of Personnel, MB/PER-11, NOAA, 600 Executive Boulevard, Rockville, Maryland 20852.

The Department of Commerce, National Oceanic and Atmospheric Administration is an equal opportunity employer.

**Faculty Position The University of Iowa** The Department of Physics and Astronomy anticipates one or two openings for tenure track faculty in August 1982. One or more waiting positions, at any rank, are also expected to be available. Preference will be given to candidates with research activity in the following experimental and theoretical areas: astronomy, astrophysics, atomic physics, condensed matter physics, elementary particle physics, nuclear physics, plasma physics, and space physics. The position involves graduate and postgraduate teaching, guidance of research students, and personal research. Interested persons should send a resume, a statement of research interests, and the names of three professional references to Search Committee, Department of Physics and Astronomy, The University of Iowa, Iowa City, IA 52242.

The University of Iowa is an equal opportunity/affirmative action employer.

## SERVICES

**Coal Deposits.** If you are searching, planning, exploring, drilling, or digging in connection with any form of energy, you need this complete, up-to-date book about the world's coal deposits. Includes production and reserves for mines. Hardcover, 8 x 9 inches, 620 pages. Tables of contents, drawings, index, references. 1980. \$158. Talcott Associates, Thunder Road, Sudbury, MA 01776, USA.

## COURSES

**MSA Amphiboles Short Course.** The Mineralogical Society of America will sponsor a Short Course on Amphiboles and Other Hydrous Pyroxenes at the Maryland Retreat Center in Elgin, Kentucky, October 28 to November 1, 1981, before the MSA/GSA Annual Meeting in Cincinnati, Ohio. Instructional Staff will be:

- J. A. Thompson, Jr. (Harvard)—Polyamphibolism and amphibolite facies
- F. C. Hawthorne (Manitoba)—Crystal chemistry of amphiboles
- S. Ghose (Univ. Washington)—Subsolidus reactions of amphiboles
- P. Robinson (Univ. Massachusetts)—Amphiboles of metamorphic rocks
- M. C. Elbert (VPI)—Phase equilibria and amphibolite facies
- O. R. Veblen (Johns Hopkins) (Convener and Editor)—Wide-chain pyroxenes
- T. Zolli (Univ. Minnesota)—Mineralogy of amphibole asbestos
- M. Ross (USGS)—Geological occurrence of amphibole asbestos

Contact: MSA, 2000 Florida Avenue, N.W., Washington, D.C. 20036. Telephone: 202/462-9913.

Registration Deadline: October 1, 1981.

## ANNOUNCEMENTS

**53rd Annual Meeting, Sedimentological Society of America.** Abstract deadline September 25 for 53rd Annual Meeting of Eastern Section, Sedimentological Society of America, Oct. 28-29, 1981, Milwaukee, WI. (R. W. Taylor, Univ. of Wisconsin-Milwaukee, Dept. of Geological Sciences, Milwaukee, WI 53201).

## STUDENT OPPORTUNITIES

**Earth Sciences Assistantships and Fellowships.** Research assistantships and fellowships are available to graduate students in the earth sciences from the Columbia University Department of Geological Sciences. The awards cover tuition and, and provide a yearly stipend of between \$5400 and \$8100.

Research is carried out at affiliated institutions including the Lamont-Doherty Geological Observatory, the Goddard Institute for Space Studies, and the American Museum of Natural History. Research topics available to students reflect the interests of the more than 300 Ph.D.-level scientists at these institutions and span virtually every area of the earth sciences.

The department encourages applications from students with an undergraduate degree in any of the natural sciences or engineering. For additional information please contact Ms. Mia Leo, Department of Geological Sciences, Columbia University, Lamont-Doherty Geological Observatory, Palisades, New York, 10964.

**Graduate Research Assistantships in Physical Oceanography.** Opportunities for graduate study with Research assistantship available for students interested in M.S. or Ph.D. programs. A summer program with stipend is open to college juniors. Write: Douglas Caldwell, School of Oceanography, Oregon State University, Corvallis, OR 97331.

## Nominations for Awards

November 15 is the deadline for nominations from the membership for AGU Fellows and December 15 for awards for 1982. Nominations for Fellows must be made on forms available from the AGU office. Nominations for medals and awards require only a letter of nomination and supporting material. The Bowie Medal, Ewing Medal, Horton Medal, and Macelwane Award committees are accepting nominations for 1982 at this time.

search on the beam plasma subject accompanying the surge of interest in fusion plasmas, one was impressed at this conference that many facets of the situation have been studied and clarified, with the basic motivation coming from the space applications. At BPD Ignition the original monoenergetic beam electrons are strongly thermalized but are also accelerated above the injected energy. The acceleration of particles by plasma instabilities, which obviously has important implications in space, also dates back to the work of Langmuir.

Another facet of the problem involved natural auroral beams and the accompanying instabilities in an attempt to understand the discrete particle spectra and other characteristics of the aurora. In one set of experiments, electron beam echoes were sought from double layers supposedly existing on auroral field lines.

Electron beams have been used extensively to probe laboratory plasmas, but at Gello the analogous technique of using particle beams to probe the distant magnetosphere to investigate magnetic field morphology, electric fields, plasma interactions, strong pitch angle scattering, and particle energization near the equatorial plane was described. These experiments are technically difficult but give basic information about magnetospheric dynamics not obtainable by other means.

Vehicle charging during beam injection has been much discussed and was well summarized at the conference, using experiments both from rockets in the ionosphere and spacecraft in distant orbits. It is clear that during the case of electron beam injection the vehicle potential rises and the flow of return current carried by ambient plasma electrons can produce a discharge (not a BPD) with the production of light, heat, and plasma wave activity.

Positive ion and plasma beams have been injected in space from many experiments and were described in some detail, including the phenomenon of wave production and trapping in the region produced by the plasma injection. An electron beam on the space shuttle is an essential component of the proposed "Tether" system, in which a long conductor will be deployed in orbit. Many features of electron beam injection and vehicle potential changes are basic to the "Tether" experiments.

The conference served a useful purpose in presenting a mélange of laboratory and space plasma results, including wave, particle and plasma diagnostics, and detailed theory and, at least for the writer, provided a major clarification in understanding how beams interact with laboratory and space plasmas. A comprehensive proceedings of the conference will soon be published by Plenum Press. Bjorn Gerdal of the Norwegian Defense Research Establishment will be the editor.

This meeting report was prepared by J. R. Winkler of the Tule Laboratory of Physics, University of Minnesota.

## Conference on Scientific Ocean Drilling (COSOD) Sponsored by JOIDES ORGANIZATION AND COORDINATION OF PLANS FOR FUTURE SCIENTIFIC OCEAN DRILLING PROGRAMS

November 16-18, 1981, Austin, Texas  
Convened by: COSOD Steering Committee, R. L. Larson, Chairman

### Sessions Planned:

- November 16, 17  
Reports and workshop discussions on the relation of the following topics to ocean drilling:
1. Origin and Evolution of Oceanic Crust
  2. Origin and Evolution of Marine Sedimentary Sequences
  3. Tectonic Evolution of Continental Margins and Oceanic Crust
  4. Causes of Long-Term Changes in the Atmosphere, Oceans, Cryosphere, Biosphere, and Magnetic Field
  5. Tools, Techniques, and Associated Studies

November 18  
General Discussion on Coordination of Existing and Planned Scientific Ocean Drilling Programs  
The meeting will be open to the general scientific community, and there is no registration fee. The conference will begin at 9:00 AM on November 16 at the Joe C. Thompson Conference Center, Room 3-102, on the University of Texas campus. For hotel reservations and other travel arrangements, please contact Mercury Travel, 1333 New Hampshire Ave., N.W., Washington D.C. 20036, phone (202) 296-7862.

## Changes

The complete Geophysical Year last appeared in the August 25 EOS. Boldface type indicates meetings sponsored or cosponsored by AGU.

## 1983

June 13-15 **International Symposium on Gas Transfer at Water Surfaces**, additional contact: G. H. Jirka, School of Civil and Environmental Engineering, Cornell University, Hollister Hall, Ithaca, NY 14853.

## New Listings

## 1981

Oct 12-13 **Lake Restoration Technology Institute**, Madison, Wis. Sponsor, University of Wisconsin-Extension. (F. Driscoll, Program Director, University of Wisconsin-

## Ocean Sciences: AGU/ASLO Joint Meeting

February 16-19, 1982  
San Antonio, Texas  
Convenor: W. D. Nowlin, Jr., (AGU) and R. W. Eppley (ASLO)

**Abstract Deadline: November 10, 1981**

### Special Sessions

- \*Additional special session
- Ocean Climate and Biological Productivity Communications
- Overview of Large Oceanographic Projects
- Biology and Physics of Gulf Stream Rings
- Relationships Between Benthos and Circulation in the Gulf of Mexico
- Geological Effects of Ocean Circulation
- Anthropogenic Inputs to the Ocean: Diverse Points of View
- Processes and Resources of the North Pacific Shelves
- Small Lake Limnology
- Marine and Freshwater Interactions
- Ocean-River Interaction: Sedimentation and Chemistry
- Particle Fluxes in the Water Column and Benthic Boundary Layer
- Relationships Between Mesoscale Physical and Biological Processes
- Biological and Physical Measurement Techniques
- Microscale Processes and Effects on Benthic Physics and Biology of Ice Edges
- Physical, Chemical and Biological Processes in Large Lakes
- \*SANDS (Shelf and Nearshore Dynamics of Sedimentation)

Call for papers published in EOS, June 23.

Extension, Department of Engineering and Applied Science, 432 North Lake Street, Madison, WI 53706.

## 1982

May 17-22 **Symposium on Remote Sensing and Mineral Exploration**, Ottawa, Ontario, Canada. Sponsor, Committee on Space Research (COSPAR) of the International Committee of Scientific Unions (ICSU). (W. D. Carter, EROS Office, U.S.G.S. (MS 730), Reston, VA 22092.)  
June 7-9 **Fourth Canadian Symposium on Mining Surveying and Deformation Measurements**, Banff, Alberta, Canada. Sponsors, Shell Canada Surveying Engineering, University of Calgary. (F. B. Claridge, Dr. R. Piteau and Associates Ltd., Suite 300, 1615 10th Avenue S.W., Calgary, Alberta, Canada T2C 0J7.)  
Sept. 13-18 **45th Annual Meeting of the Meteorological Society**, St. Louis, Mo. (G. Croza, Washington University, Box 1105, St. Louis, MO 63130.)

## Meetings

### NATO Conference on Space Plasmas

During the week of April 21-28, 1981, a group of research physicists with a special interest in artificial particle beams as applied to space plasma studies met at a conference site at Gello, in the mountains of central Norway. Major support was provided by NATO, and the meeting was the first of a new series known as NATO Advanced Research Institutes. The session format somewhat resembled the recent Chapman conference held at Yosemite National Park. Sessions were held each morning, Tuesday through Saturday, and after a lunch and recreational break, continued in the afternoon and early evening, up to dinner hour. The attendance was limited to about 65 persons, who were encouraged to stay together for the entire conference period. The unique character of the meeting was the result of current interest in the very specialized topic, the International Helandance, and the excellent accommodations at the Vestlia Hovellidaleid.

The conference was organized by the Norwegian Defence Research Establishment and which is one of the groups active in the applications of particle beams to space research. The program committee consisted of B. N. Meshlun, C. Beghin, W. Bernsten, A. Johnstone, and J. R. Winkler. The subject matter was divided into major topics, with one or more 40-minute summary papers in each area, grouped as follows: accelerator experiments in space, ac-

celerator experiments in laboratory, the theory of beam plasma interactions, natural beam plasma phenomena in near space, the neutralization of charged bodies in a plasma, and a final session of future plans, discussions, and recommendations. Each subject area beside the summary talks included various contributed papers and a summary discussion organized by the session leader.

In recent years, particle accelerators carried by space vehicles have provided a valuable supplement to passive diagnostic experiments in exploration of space plasmas. Already, at least 30 large sounding rockets have carried accelerators or other types of plasma injectors into the ionosphere, and small electron or ion injectors have been used on orbiting vehicles. Much interest centers around the large accelerators to be carried by the space shuttle with accompanying plasma diagnostic instrumentation. The central interest of the conference was the interaction of a particle beam with a background plasma. The beam plasma interaction is one of the oldest known phenomena in plasma physics and dates back to the work of Irving Langmuir. In the '50's and '60's the subject was studied by Bernstein (1961), by Bohm and Gross, and by Vlasov and Landau in the USSR. When it was proposed to inject particle beams from space vehicles, there was much concern that plasma waves would dissipate the beam energy catastrophically and rapidly thermalize the beam particles. Although a completely catastrophic beam loss does not seem to occur in practice, nevertheless strong interactions have been observed.

Plasma and wave diagnostics were widely discussed from measurements made in very large vacuum facilities in Japan, in Europe and in the Johnson Space Center, USA, as well as from space vehicles. A particularly definitive experiment was reported by the Stenzel group at UCLA and development of the basic beam plasma interaction in a region below the BPD (beam plasma discharge) Ignition.

threshold. The experiment was conducted in a moderate-size laboratory chamber and demonstrated how plasma waves rapidly convert to ion acoustic and finally to electromagnetic mode, which can then be observed at large distances from the source. Electromagnetic radiation has been observed at ground level during the injection of electron beams in Soviet 'Zamitz' experiments, during the French-Soviet 'ARAKS' launchings, and during the U.S. 'ECHO' flights. Whistler mode and other waves have been observed in space near the beam-emitting vehicle and were actively discussed at Gello.

One of the most dramatic interactions is the BPD discovered by Smullen and Gelly in the U.S. and studied by Katerchko and Fainberg and others in the USSR and by Bernstein (W.) and many others in the U.S. Numerous papers at the conference described recent laboratory studies of the BPD, using for example the giant vacuum facilities at the Johnson Space Center (now closed because of budgetary problems) and a wide variety of instrumentation, including television, wave and particle detectors, and plasma diagnostics. It is recognized that the spectacularly bright luminosity which appears in the chamber experiments above a certain threshold has the same nature as the classic RF discharge in a neutral gas except that the intense fluctuating electric fields are generated by a collective mode instability in the beam plasma interaction instead of by an external RF source and that a substantial neutral population is needed for ignition. An example of a beam-plasma discharge is shown in the figure (see cover).

A number of papers analyzed rocket experiments for the presence of the BPD in the ionosphere. Some cases seem quite certain; others are contradictory. Whistler mode radiation measured during beam injection in space strongly resembled that seen in the laboratory during BPD. However, space environment has no walls, and the scaling parameters must be adjusted on a different basis than the laboratory. Deeply an extensive body of previous laboratory re-

## GAP

### Geomagnetism and Paleomagnetism

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## Meteorology

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### Particles and Fields—Interplanetary Space

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